

The specification is objected to due to the spacing of the lines in the papers as originally filed. Claims 1-3 and 10 stand rejected as being indefinite. Claims 1 and 2 stand rejected as being anticipated by the van Klinken et al. patent. Claims 3 and 10 stand rejected as being obvious over the van Klinken et al. patent as applied above.

1. Objection to the Specification

The Examiner has objected to the specification due to the spacing of the lines. In response thereto, Applicant hereby submits a substitute specification with proper spacing of the lines for easier reading and entry of amendments. Applicant hereby states that no amendments have been made to the substitute specification, and that no new matter is included in the substitute specification. Due to the fact that no amendments have been made to the substitute specification, Applicant has not submitted a marked-up copy thereof. However, Applicant respectfully requests that the above amendment to the specification still be made.

2. Rejection of Claims 1-3 and 10 Under

35 U.S.C. 112, Second Paragraph

Claims 1-3 and 10 stand rejected under 35 U.S.C. 112, second

paragraph as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. As a basis for this rejection, the Office Action states:

In claim 1, the omitted structural cooperative relationships are among the heater, the atmospheric fractionating tower, a further heater, a vacuum fractionating tower, an SDA unit, a thermal cracker, and a further thermal cracker.

In claim 3, the omitted structural cooperative relationships are among the apparatus of claim 1 and the hydrotreater, a still further heater, a further atmospheric fractionating tower, an additional heater, a further vacuum fractionating tower

In claim 10, the omitted structural cooperative relationships are among the apparatus of claim 1 and the hydrotreater, a further heater, a further atmospheric fractionating column, a still further heater, a further vacuum fractionating column

RESPONSE

Applicant respectfully traverses this rejection and request reconsideration and withdrawal thereof.

Applicant respectfully submits that the claims set forth structural cooperation between the various elements contained therein. MPEP §2173.05 (b) states, "Acceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in light of the specification." In addition, MPEP §2172.01 states that "a claim which fails to interrelate essential elements of the invention as defined by

applicant(s) in the specification may be rejected...for failure to point out and distinctly claim the invention." Applicants respectfully submit that the present claims adequately detail the interrelationship of the elements to a degree such that one of ordinary skill in the art would understand what is being claimed.

In particular, Applicant respectfully submits that the elements of the claims are clearly interrelated as follows. With respect to claim 1, the heater heats the heavy hydrocarbon feed, which is then fed to the atmospheric distillation column, thus showing interrelationship between the heater and the atmospheric distillation column. The atmospheric distillation column produces light atmospheric fractions and atmospheric bottoms, which are then heated in the further heater thereby producing heated atmospheric bottoms and showing interrelationship between the atmospheric distillation column and the further heater. The heated atmospheric bottoms are fractionated in the vacuum fractionator, showing interrelationship between the further heater and the vacuum fractionating column. The vacuum fractionating column produces light vacuum fractions and vacuum residue, which is solvent de-asphalted in the SDA, showing interrelationship between the vacuum fractionator and the SDA. The SDA produces deasphalting oil (DAO) and asphaltenes. The DAO is thermally cracked in the thermal

cracker, showing interrelationship between the SDA and thermal cracker. The thermal cracker produces thermally cracked product which is recycled to the inlet of the atmospheric fractionating tower, thus showing interrelationship between the thermal cracker and the atmospheric fractionating tower. The light vacuum fractions are thermally cracked in a further cracker, producing a further thermally cracked product and showing interrelationship between the vacuum fractionating tower and the further cracker. The further thermally cracked product is recycled to the inlet of the atmospheric fractionating tower, showing interrelationship between the further cracker and the atmospheric fractionating tower. Thus, Applicant has indicated interrelationship between the various elements of claim 1 and respectfully submits that claim 1 is definite. Applicant respectfully requests reconsideration and withdrawal of the rejection thereof as being indefinite.

Likewise, an analysis of claims 3 and 10 indicate interrelationships between the elements of the claim. The hydrotreater treats a portion of the light vacuum fractions from the vacuum fractionating tower of claim 1, thus showing interrelationship between claims 3 and 10 and claim 1. The hydrotreater produces a treated hydrocarbon feed which is then heated in the still further heater, producing heated treated

hydrocarbon stream and showing interrelationship between the hydrotreater and still further heater. The heated treated hydrocarbon stream is fractionated in the further atmospheric fractionating tower, producing further light atmospheric fractions and further atmospheric bottoms, and showing interrelationship between the still further heater and the further atmospheric fractionating tower. The further atmospheric bottoms are heated in the additional heater, showing interrelationship between the additional heater and the further atmospheric fractionating tower. The additional heater produces heated, further atmospheric bottoms, which are fractionated in the further vacuum fractionating tower, showing interrelationship between the additional heater and the further vacuum fractionating tower. Finally, the further vacuum fractionating tower produces further light vacuum fractions, the heavier portion of which is supplied to the thermal cracker, thus providing interrelationship between the further vacuum fractionating tower and the thermal cracker. Thus, Applicant has indicated interrelationship between the various elements of claims 1 and 3 and respectfully submits that claims 3 and 10 are definite. Applicant respectfully requests reconsideration and withdrawal of the rejection thereof as being indefinite.

Accordingly, Applicant respectfully submits that claims 1-3

and 10 provide proper interrelationship between the various elements thereof, and as such, are definite. Applicant respectfully requests reconsideration and withdrawal of the rejection thereof as being indefinite.

3. Rejection of Claims 1 and 2 Under 35 U.S.C. 102(b)

Claims 1 and 2 stand rejected under 35 U.S.C. 102(b) as being anticipated by van Klinken et al. (U.S. Patent No. 4,039,429). As a basis for this rejection, the Office Action states:

With regard to claim 1, van Klinken discloses a heater for heating the heavy hydrocarbons and an atmospheric fractionating tower for fractionating the heated heavy hydrocarbon feed. Van Klinken calls this combination a "First Atmospheric Distilling Zone (Figure 1 (2)). Since a still contains both a heat source and a fractionating tower, van Klinken's description "atmospheric distilling zone" is equivalent to the heater and an atmospheric fractionating tower of the present invention.

Van Klinken discloses a further heater and a vacuum fractionating tower ("First Vacuum Distilling Zone" Figure 1 (3)).

Van Klinken discloses a solvent deasphalting (SDA) unit (Figure 1 (4)).

Van Klinken discloses a thermal cracker (cracker (10) operates at 450°C to 525°C, column 3, line 50, and thus is thermal as well as catalytic).

Van Klinken discloses a thermal cracker (10) for crackeing the deasphalted oil.

With regard to claim 2, van Klinken discloses means (21) for supplying only the heavy portion of the light vacuum fractions to the thermal cracker.

RESPONSE

Applicant respectfully traverses this rejection and respectfully requests reconsideration and withdrawal thereof.

To establish an anticipation rejection, every claimed element must be found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. V. Union Oil Co. of California*, 814 F2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987); See also, MPEP § 2131. Applicant respectfully submits that the Examiner has not met this burden.

Independent claim 1, the only independent claim currently under consideration, is drawn to an apparatus of processing heavy hydrocarbon feed comprising: a heater for heating said heavy hydrocarbon feed; an atmospheric fractionating tower for fractionating the heated heavy hydrocarbon feed fed to the inlet of the atmospheric fractionating tower producing light atmospheric fractions and atmospheric bottoms; a further heater for heating said atmospheric bottoms and producing heated atmospheric bottoms; a vacuum fractionating tower for fractionating said heated atmospheric bottoms and producing light vacuum fractions and vacuum residue; a solvent deasphalting (SDA) unit for producing deasphalting oil (DAO) and asphaltenes from said vacuum residue; a thermal cracker for thermally cracking said deasphalted oil and

producing a thermally cracked product which is recycled to the inlet of said atmospheric fractionating tower; and a further cracker for thermally cracking said light vacuum fractions for producing a further thermally cracked product which is recycled to the inlet of said atmospheric fractionating tower. Thus, in order for van Klinken to anticipate claim 1, van Klinken must disclose all of the limitations set forth above. Applicant respectfully submits that van Klinken fails to do so, and therefore does not anticipate the claims.

Applicant respectfully submits that van Klinken discloses a combination of processes that are designed to convert atmospheric reduced crude to light products through conversion by Fluid Catalytic Cracking (FCC). Van Klinken discloses several combinations of vacuum distillation, visbreaking, deasphalting and FCC to obtain light products. As can be seen above, the presently claimed subject matter does not rely on FCC for conversion of the gas oil or deasphalted oil to convert the heavy oils to lighter fractions, as is required in the van Klinken patent. Further, van Klinken discloses visbreaking to process the asphalt and/or vacuum reduced crude. Instead, the present claims claim the conversion of the distillable gas oils and the deasphalted oil by thermal cracking, and does not thermal crack the asphaltenes-containing

fractions of the feed. The present claims also contemplate the use of the process to treat and convert whole crude oil, not just atmospheric reduced crude.

Turning now to further differences between the claims and van Klinken, Applicant respectfully submits that van Klinken fails to disclose all of the claimed subject matter of claims 1 and 2, with claim 2 depending from claim 1 and containing all of the limitations found therein. In particular, claim 1 requires an atmospheric fractionating tower for fractionating the heated heavy hydrocarbon feed as well as a vacuum fractionating tower for fractionating the heated atmospheric bottoms produced by the atmospheric fractionating tower. Further, claim 1 requires a thermal cracker for thermally cracking the deasphalted oil produced by the solvent deasphalting unit and a further thermal cracker for thermally cracking the light vacuum fractions produced by the vacuum fractionating tower. In addition, the thermally cracked product from each of the crackers is recycled to the atmospheric fractionating tower in which the heated heavy hydrocarbon feed is fed.

In contrast, van Klinken discloses an apparatus in which atmospheric reduced crude is treated and converted. The process in which van Klinken treats the atmospheric reduced crude is by Fluid

Catalytic Cracking (FCC). Applicants respectfully submit that van Klinken fails to disclose each and every element of claim 1, in particular the arrangement of the elements of the claim and the two thermal crackers, with the thermally cracked product being recycled to the initial atmospheric distillation column.

Accordingly, Applicant respectfully submits that van Klinken does not disclose all of the limitations of claim 1 (and therefore, of claim 2, which contains all of the limitations of claim 1), and does not anticipate claim 1. Applicant respectfully requests reconsideration and withdrawal of the rejection.

4. Rejection of Claims 3 and 10 Under 35 U.S.C. 103(a)

Claims 3 and 10 stand rejected under 35 U.S.C. 103(a) as being obvious over van Klinken et al. (U.S. Patent No. 4,039,429) as applied to claims 1 and 2 above. As a basis for the rejection, the Office Action states:

With regard to claims 3 and 10, the apparatus of van Klinken includes essentially the same apparatus as the present claim, including a hydrotreater (9), a heater and atmospheric fractionating unit (Figure 1 (11), the distilling zone includes a heater and fractionating tower) but fails expressly to disclose an additional vacuum fractionating apparatus.

Van Klinken discloses an atmospheric fractionating tower (2) followed by a vacuum fractionating tower (3). At the time of the invention it would have been obvious to one skilled in the art to follow the atmospheric fractionating tower (Figure 1 (11)) with a vacuum fractionating tower as was done with the upstream atmospheric fractionating tower (Figure 1 (2)).

The motivation would have been to further separate the process stream into fractions, just as was done upstream by the atmospheric fractionating tower (2) and the vacuum fractionating tower (3).

RESPONSE

Applicant respectfully traverses this rejection and requests reconsideration and withdrawal thereof.

The reference of record, van Klinken et al., does not teach or suggest applicants' inventive subject matter as a whole, as recited in the amended claims. Further, there is no teaching or suggestion in this reference which would lead the ordinary skilled artisan to modify the reference to derive the subject matter as defined in the amended claims.

The U.S. Supreme Court in *Graham v. John Deere Co.*, 148 U.S.P.Q. 459 (1966) held that non-obviousness was determined under § 103 by (1) determining the scope and content of the prior art; (2) ascertaining the differences between the prior art and the claims at issue; (3) resolving the level of ordinary skill in the art; and, (4) inquiring as to any objective evidence of nonobviousness.

As is discussed above with respect to the anticipation rejection, the arguments of which are hereby incorporated, van Klinken fails to disclose each of the elements of claim 1, from

which rejected claims 3 and 10 depend. Thus, van Klinken also fails to teach and disclose, and render obvious, the elements claims 3 and 10, which add further limitations to claim 1.

Claims 3 and 10 add a further set of elements to the apparatus of claim 1. The additional elements as arranged and claimed in claims 3 and 10 are not disclosed in the van Klinken patent. In particular, the presence and arrangement of the hydrotreater, further atmospheric fractionating column, and additional vacuum fractionating column are not disclosed in the van Klinken patent. Further, since van Klinken discloses Fluid Catalytic Cracking as the process for cracking the atmospheric reduced crude, there is no motivation to include these additional elements in the apparatus of van Klinken in an effort to obtain the claimed subject matter. Accordingly, Applicant respectfully submits that claims 3 and 10 are not rendered obvious by van Klinken, as there is no motivation or teaching to modify van Klinken in an effort to obtain the presently claimed subject matter.

Applicants respectfully request reconsideration and withdrawal of the rejection of claims 3 and 10 as being obvious over van Klinken et al.

CONCLUSION

In view of the foregoing, applicants respectfully request the Examiner to reconsider and withdraw the all pending rejections, and to allow all of the claims pending in this application.

If the Examiner has any questions or comments regarding this matter, he is welcomed to contact the undersigned attorney at the below-listed number and address.

Respectfully submitted,

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Date:

May 14, 2001

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Attorney Docket No. P-15149
Group Art Unit: 1764
Examiner: R. Varcoe, Jr.

Attachment A - Marked-up copy of amended specification

Please amend page 4, lines 4-10 as follows:

Many proposals thus have [bfor] been for dealing with
[crudand] crude and metals. And while many are technically
viable, they appear to have achieved little or no
commercialization, due, in large measure, to the high cost of the
technology involved. Usually such cost takes the form of
increased catalyst contamination by the metals and/or the carbon
deposition resulting from the attempted conversion of the
asphaltene fractions.

Serial No. 09/431,159
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Attorney Docket No. P-15149
Group Art Unit: 1764
Examiner: R. Varcoe, Jr.

Attachment B - Clean copy of amended specification

Please amend page 4, lines 4-10 as follows:

B) Many proposals thus have been for dealing with crude and metals. And while many are technically viable, they appear to have achieved little or no commercialization, due, in large measure, to the high cost of the technology involved. Usually such cost takes the form of increased catalyst contamination by the metals and/or the carbon deposition resulting from the attempted conversion of the asphaltene fractions.
